

PURWANCHAL UNIVERSITY
VII SEMESTER FINAL EXAMINATION-2004

LEVEL : B. E. (Civil)

SUBJECT: BEG466CI, Design of Masonary Structures.

Full Marks: 80

TIME: 03:00 hrs

Pass marks: 32

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Attempt any FOUR questions.

- Q. [1] [a] A reinforced brickwork slab is made of one layer of brick on edge with total depth of 110mm. The mortar joint is 40mm wide. The reinforcement consists of 8mm dia bars with $f_y=415$ MPa. The thickness of the brick is 60mm and the reinforcement is @100mm centre to centre. Find the ultimate moment capacity of 1000mm wide strip of slab. The characteristic strength of the brickwork is 20 MPa. [6]
- [b] Explain with sketches some details of reinforced masonry walls. [4]
- Q. [2] [a] Calculate the effective thickness of a cavity wall made of two leaves. The thickness of each of the leaves is 110mm and the gap between them is 50mm. One of the leaves of the wall is stiffened by cross walls of width 110mm placed @3m c/c and both leaves are tied together appropriately by steel bars. [6]

- [b] Explain the types of mortar M2, M1, H2 and H1 with their general properties and also mention the general range of strength of masonry units to be used with, these mortars. [4]

- Q. [3] [a] Design a brick infill wall 4.5m long and 3.0m high to resist a horizontal earthquake force out of its plane. Assume the seismic load to be uniformly distributed across the height of the wall. Earthquake acceleration is 0.10g. The wall is supported on all four edges. Assume appropriate brick and mortar. [7]
- [b] Explain the specific features of masonry structures in Nepal. [3]
- Q. [4] [a] Explain the methods of testing of brick strengths in compression and tension. [4]
- [b] Design a solid masonry wall of a one-storey building to carry a 120mm thick RCC slab with 3.0m ceiling height. The RCC slab is 4.0m on both sides of the wall. The live load on the slab is 4 KN/m². Assume necessary data if required. [6]
- Q. [5] [a] Explain the effect of pre-compression in a laterally loaded wall. Derive the equation. [5]
- [b] Calculate the basic compressive strength of a masonry at the age of 28 days. The mortar used is H2. The crushing strength of the masonry unit is 15 MPa and the height to width ratio of the masonry unit (as laid) is 1.5. [5]

PURWANCHAL UNIVERSITY
VII SEMESTER FINAL EXAMINATION-2005

LEVEL : B. E. (Civil)

SUBJECT: BEG466CI, Design of Masonry Structures.

Full Marks: 80

TIME: 03:00 hrs

Pass marks: 32

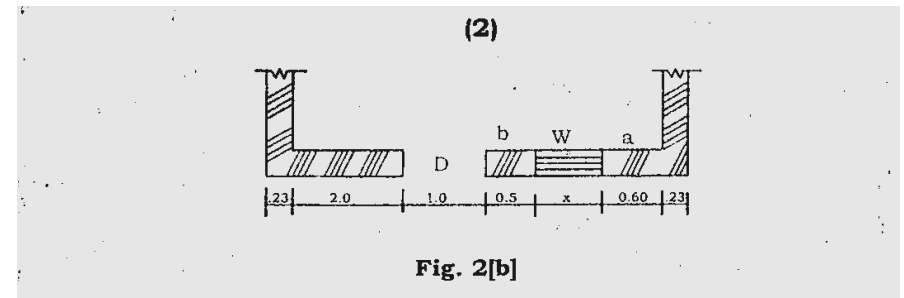
Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side. Sketch properly wherever required. Assume necessary data appropriately if required. Relevant Masonry Codes are allowed.

Attempt any FOUR questions.

- Q. [1] [a] Describe basic method of testing of brick size and explain about over-size and under size brick. [5]
[b] Describe the seismic strengthening provision for stone buildings mostly used in rural Nepal. [5]
- Q. [2] [a] Describe the most common workmanship needed in brickwork. [4]
[b] An external wall of a single storied building is 23cm thick and openings as shown in Fig 2[b]. Plinth level is limited to 0.90m above from the top of foundation footing and ceiling height is 2.97m. One way RCC slab of 3.0m clear span bears on the wall and is 10cm thick. Calculate the maximum stress in the wall, strength of bricks and grade of mortar. Consider 1.5 KN/m^2 live load and 0.8m high parapet wall of 23cm thick. Calculate

maximum value of x for the window W shown in Figure. [6]



- Q. [3] [a] What are the factors that affecting the compressive strength of stone masonry? [5]
[b] Derive the equation for the lateral load analysis of walls subjected to pre-compression with and without returns. [5]
- Q. [4] [a] A 23cm thick wall using modular bricks carries a load of 100 kg/m at the top having resultant eccentricity ratio of $1/12$. The wall is 5m long between cross walls and is of 3.4m clear height between RCC slabs. What should be the strength of brick and grade of mortar? Assume that joints are not racked. [5]
[b] Design a boundary wall of height 2.25m up to the top of the coping. Assume uniformly distributed wind pressure of 125 kg/m^2 . The safe bearing pressure of soil is 120 KN/m^2 . Adopt thickness of wall = 375mm and coping size = 495mm x 110mm. [5]
- Q. [5] [a] Explain the stress distribution in brick masonry work and moment carrying capacity of the flexural members. [5]

[b] Write down the basic principle of design of reinforced brick concrete slab. [5]

Sp/Wp	tp/tw/2	tp/tw \geq 3
6	1.4	2.0
8	1.3	1.7
10	1.2	1.4
15	1.1	1.2
20 or more	1.0	1.0

Stress Reduction Factor for Slenderness Ratio and Eccentricity			
Slenderness Ratio	Load Eccentricity		
	0	1/24	1/12
10	0.89	0.88	0.87
12	0.84	0.83	0.81
14	0.78	0.76	0.74
16	0.73	0.71	0.68
18	0.67	0.64	0.61
20	0.62	0.59	0.55
22	0.56	0.52	0.48
24	0.51	0.47	0.42
26	0.45	0.40	0.35
27	0.43	0.38	0.33

Basic Compressive for Masonry (after 28 days)			
Mortar Type	Strength of Masonry Unit, MPa		
	5.0	7.5	10.0
H2	0.50	0.74	0.96
M1	0.50	0.74	0.96
M2	0.44	0.59	0.81
M3	0.41	0.56	0.75

Shape Modification Factor for Masonry Unit			
ht./width of units as Laid	Shape Modification Factor for Unit Having Crushing Strength, Mpa		
	5.0	7.5	10.0
Up to 0.75	1.00	1.00	1.00
1	1.20	1.20	1.10
1.5	1.50	1.30	1.20